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New Chicago Passenger Terminal of the Chicago and Northwestern Railway, with Especial Reference to the Illuminating Thereof.

[Prepared for the JOURNAL, by MR. C. A. LUTHER.]

The opening of the new passenger terminal of the Chicago and Northwestern Railway Company, in Chicago, located on Madison street (one of Chicago's busiest thoroughfares) between Canal and Clinton streets, marks the making of a worthy gateway to the Golden West.

Whatever allurement lies in this land of promise, or beauty in the old-world left behind, finds expression in the new station. It is like a picture from a European cathedral town set down in the heart of America's most cosmopolitan city. Its substantial walls are of grey granite brought from Maine; its architecture is that of the early Italian renaissance.

The Building Itself.—The portico (main entrance on Madison street) is supported on a colonnade of 6 granite columns 3 stories high. The sort of entrance first designed and built for holy temples, now invites the traveling public. Back of the colonnade is the high Gothic, vaulted-vestibule, where the colors are so soft and nicely blended as to cause the arrangement of this public space to be so suggestive of some old-world cathedral or cloister, that it is a pleasure for the traveling public to here tarry-a-while.

The Building.

The vestibule, which extends across the entire Madison street front of the building, is 132 feet wide, 22 feet deep and 40 feet bigh, with Gothic, vaulted-roof, grey granite walls, green trimmed windows in the upper parts and mahogany woodwork along the lower spaces. From the high ceilings there are suspended, by old bronze chains, 3 handsomely carved, indirect-lighting bowls, made from Italian alabaster marble. Each bowl is equipped with four, 150-watt tungsten lamps, that shed a softly subdued light throughout the vestibule.

Sweeping gracefully from each end of the vestibule, are broad winding stairways that lead to the main waiting room, with galleries at the top landings, from which the traveler may get a general view of the vestibule. On these galleries there are, mounted on handsome bronze stands, 2 more alabaster marble, indirect-lighting bowls, equipped with four, 150-watt tungsten lamps, that are very effective, not alone for their artistic appearance, but also for the soft, shadowless illumination derived from them.

You pass from the vestibule into the public space on the street level, as directly in front of this entrance, at the farther side of the public space, is the grand stairway, leading directly into the concourse, and branching to the right and left into the main waiting room.

View Towards Grand Stairway, from Madison Street Entrance.—This public space has many pillars and the paneled ceiling is gracefully curved and tiled with terra cotta to match the general color scheme of the entire space. In the arched panels are hung heavy, 18-inch, block-cut, opal balls, equipped with four 150-watt, tungsten lamps, so wired that two lamps can be turned on at a time. These units are suspended 15 feet above the floor, are spaced every 25 feet apart, and are very effective.

Ticket Office Lobby.—To the right of the entrance is the ticket office, the ticket windows of which are divided into bays or sections of 8, 10 and 5 windows, respectively, and over each window are illuminated signs that read: "Tickets," "Commutation," "Parlor," "Pullman." These signs are movable, so they may be placed over any window, and are illuminated by 25-watt tungsten lamps inside. Each window is 3 feet wide, with sliding glass sash, and is protected by a bronze grille in front, starting 2 inches above the counter.

There are 28 ticket windows facing north, and 5 facing west; also, 4 in the private office facing west, near the east entrance, for future use if necessary.

Each ticket seller is assigned 2 windows and is protected by the wire grill partitions, 7 feet high, and extending back 5 feet The

grills may be changed readily from one window to the other to make any desired arrangement. When in use one window is open with the proper illuminated sign over the top, and the other is closed. A 2-bracket electric light, on the mullion on each side of the ticket window, equipped with alba shades and 25-watt lamps, throws a generous light upon the working plane.

There are 9 local ticket cases, each containing complete stocks of local tickets and 5 interline (coupon) ticket cases, about 4 feet high, with a total capacity of 1,840 forms, and, when placed side-by-side, extend about 30 feet. They are equipped with shallow drawers of 8 compartments, 1 inch deep, and a row of linolite lamps throws a strong light on the contents of the drawer when opened. Besides these separate lighting units there are 150-watt lamps, equipped with alba shades, suspended by drops from the ceiling, spaced 15 feet apart and 12 feet above the floor. Special telephone service is provided by two private lines, one automatic, connecting with all points in the station, the other over a direct line to the city office. Push-buttons of call bells are placed at various ticket windows and desks, enabling passenger agents, ushers, etc., to be quickly summoned to assist passengers at the windows.

Baggage Room.—Passing from the ticket office one enters the baggage room where all the checking is done. There is a white counter, 135 feet long, which gives ample accommodation, and is connected by means of pneumatic tubes with the out-baggage room, located at the north end of the station. This room is properly illuminated through the medium of three 150-watt lamps, inclosed in 16-inch alba balls, suspended 12 feet above the floor and spaced every 18 feet apart.

At the Canal street side of the public space a broad stairway leads down to the basement, where large and handsomely appointed toilet rooms are provided for men travellers. The rest of the basement is used for lockers, the power plant for the elevators and an auxiliary lighting plant for the terminal, where they have a switchboard composed of 9 panels and two 75-kw., 3-wire balancing machines for maintaining an even voltage on each side of the 3-wire system for lighting the station. In the basement is also located the kitchen, which is illuminated by 100 and 150-watt lamps, equipped with alba shades, spaced every 20 feet apart and suspended 10 feet above the floor. The refrigerators are equipped with snap-switches and are illuminated by 40-watt bare lamps.

On the Clinton street side of the first floor is located a well-lighted and well-appointed lunch room, illuminated by 5-light fixtures, with one 150-watt and four 100-watt units, enclosed in alba balls, suspended 12 feet above the floor and spaced 15 feet apart.

Stairway.—Going up the grey, polished marble, stairway divided by brass railings, we catch the first glimpse of the main waiting room.

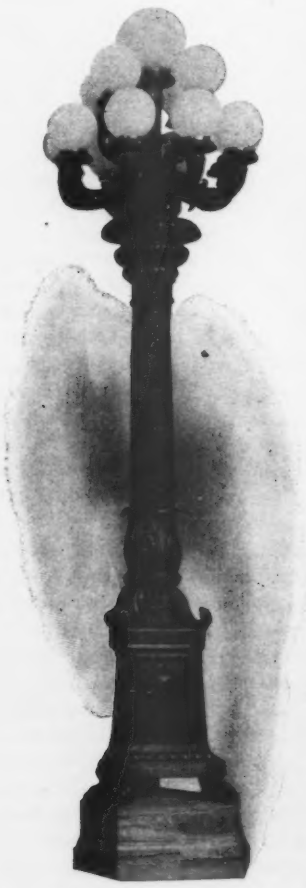
Main Waiting Room.—The train caller's balcony overlooks the stairway, a door from which opens on a longer gallery overlooking the concourse. The main waiting room, which is the principal architectural feature of the Terminal, is a piece of art. It is treated as a great Roman atrium (the entrance room

Looking towards Grand Stairway from Madison Street Entrance

Ticket Office Lobby.

Baggage Room.

or chief apartment of an ancient Roman house) with barrel-vaulted roof. The pilasters and entire order, up to the spring vault, are a dull-finished, light-pink, Tennessee marble. The columns standing free from the main walls are of Greek cipolino marble, the delicate green hue of which harmonizes perfectly with the greenish-bronze of the metal work framing the glass between the pilasters.



Bronze Standard.

Stairway.

Main Waiting Room.

The vault, or roof, is of ornamental tile construction, with richly ornamented ribs of terra cotta of a color to harmonize with the marble of the walls and pillars. The size of this main waiting room is 100 feet by 200 feet, and the top of the roof arch is 85 feet from the tiled floor. Natural light comes softly through the semi-elliptical windows, 60 feet in diameter at each end of the vault, and through 10 semi-circular lunettes piercing the vaults and 5 feet on each side.

The room is lighted artificially by reflected indirect light, from 250-watt lamps, 420 in number, equipped with reflectors, which are hid from the public on the ledge around the spring of the vaulted roof and by direct artificial light from the 14 beautiful bronze electroliers that hang between the pillars on each side of the waiting room. These fixtures, known as the "Soffit lighting units," are equipped with 13 lights each, one 150-watt and twelve 100-watt lamps. In addition to these lighting units 8 large standards of greenish bronze are located at each end, and have 13 lights each, equipped the same as the electroliers. These standards are 14 feet high, and the electroliers are suspended 20 feet above the floor.

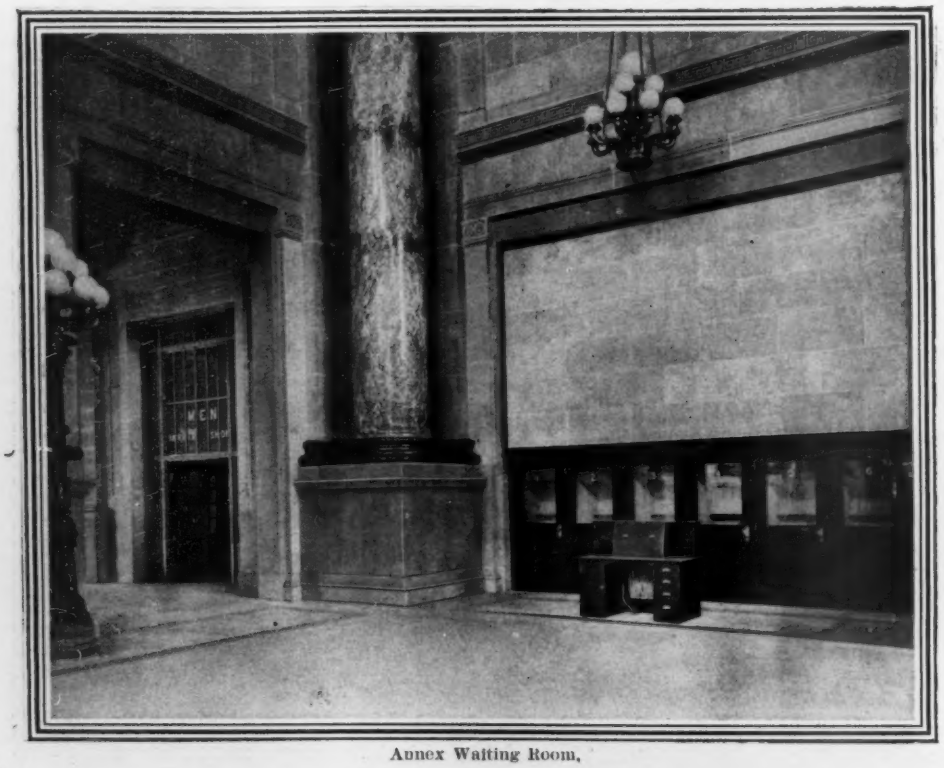
Bronze Standard.—All lighting units in the waiting room and in the concourse are controlled from a special push-button panel located in the information booth. The large mahogany seats that appear to take up but a small part of the floor, will accommodate comfortably more than 300 persons, each bank of seats being numbered.

Annex Waiting Room.—Along the entire north side of the main waiting room are doors leading into the concourse. Branching off from the waiting room is the annex, or additional waiting room, 56 feet by 72 feet in size, and 25 feet high, that is illuminated by chain-suspended circles with 8 lights suspended therefrom. These units are 60-watt tungsten lamps, inclosed in alba balls, 15 feet above the floor, and spaced 18 feet apart.

Annex.—From the Annex opens the smoking room which is illuminated by 4 fixtures, suspended 12 feet above the floor, and spaced 18 feet apart. These fixtures have 8 lights each of 60-watt lamps.

The toilet rooms opening from the smoking room, as well as all the other toilet rooms, are equipped with 2-light fixtures equipped with 60-watt lamps and alba shades.

The new sanitary system of soft-tissue paper towels is installed in all washrooms throughout the bulding, as well as washrooms for emigrants and shower baths. All the waiting rooms have ample



Annex Waiting Room.

The Annex.

sanitary drinking fountains where filtered water at a temperature of 40° is dispensed freely for satisfying the thirst of the public.

From the Annex, also opens the barber shop, equipped with direct and indirect lighting units. A row of brackets is located on each side of the mirrors, carrying 25-watt lamps and alba shades. In the center of ceiling are suspended brass disks inclosed in which are four, 150-watt lamps that are used for the indirect illumination. These are hung 18 feet above the floor.

(To be Continued.)

THE U. G. I. Company is constructing a water gas annex on the plant of the old Bristol (Pa.) Gas Light Company, which property was acquired by the former quite some time ago. The U. G. I. folks are also considering the good policy of hooking up the surrounding districts of Hulmeville, Langhorne, Morrisville and Tullytown by means of a high pressure belt line.

[PROCEEDINGS, FURNISHED BY THE SECRETARY. —CONTINUED FROM PAGE 29.]

SEVENTH ANNUAL MEETING, IOWA DISTRICT GAS ASSOCIATION.

HELD IN LAFAYETTE INN, CLINTON, IA., MAY 24 AND 25.

SECOND DAY, MORNING SESSION.

The President—We will now pass to the

REPORT OF COMMITTEE ON MANUFACTURE.

This was read by Mr. W. J. Bertke (Chairman) as follows:

While no great changes or improvements have been made in the process of gas manufacture during the past year, there has, however, been a general trend toward better economy and efficiency. The following are a few conditions in set operation that have been tried out with some success during the year just passed and may be of interest to you, and while not something new to all of you, they may still be of benefit to some.

At one works a 3-way cock was installed in the steam line, so arranged and connected by levers to the mechanism of the reverse steam apparatus, that the steam was automatically admitted to the bottom or top of the generator while operating the hot valves. This allowed the change, from up to down-runs, or the reverse, to be made without loss of time. Thus a portion of each run can be made a down run (usually referred to as a "split run"), instead of making certain runs entirely up and others entirely down.

Being able to make these changes of up-and-down runs without loss of time, enables a better and more uniform condition of the fuel bed to be kept and consequently, a better quality and make of gas results. In the usual order of making gas on a water gas machine, the stack valve is opened immediately after shutting off the steam at the end of the run and the gas which fills the set is driven off into the air. It has been tried with success, that the stack valve can be left down after steam is shut off, allowing the generator blast to drive the gas in the set into the relief holder, then opening the stack valve when gas is all or nearly out of set. There is some danger connected with this system, unless the conditions are right and nec.ssary care is taken. However, saving this amount of gas, which is ordinarily wasted, has an appreciable effect on results.

With water tube boilers usually a certain amount of trouble is due to leaky hand-hole gaskets. This is particularly true in those localities where the water is bad, and compound or softener is used.

A very inexpensive lead gasket, which has entirely overcome this trouble in some plants, can be made by providing a suitable mould and making your own gaskets. At one place a mould was turned out of a pair of 4 inch flanges and lead from old lead meter connection was utilized. The labor involved, in making these gaskets, is very small and the lead can be used over and over again.

Discussion.

Mr. Addy—Concerning the statement made in the report that there is some danger in running air through the machine to blow out this gas at the end of the run, I would like to know why there should be any danger. If we have pressure enough so that the gas can't work back, I should think it would be perfectly safe to do that.

Mr. Bertke—If the gentleman will look over the paper again, the statement that there is some danger has been qualified. There is danger unless the conditions are right.

Mr. Vincent—I would like to ask Mr. Bertke the make of the 3-way cock that he uses on his reverse steam apparatus.

Mr. Bertke—The Bordo cock.

Mr. Vincent—Has that been satisfactory. I tried it out, and my principal difficulty was in keeping the cock steam-tight. It is a fine device if you can keep it tight, but the cocks that we tried out gave us a great deal of trouble, although we didn't have the Bordo cock.

Mr. Bertke—We have had it on 6 weeks and there was no trouble whatever in that time, It seems to be of sufficient weight and strength, and we anticipate no trouble.

Mr. Warnick—We use the Bordo cock. It does not leak. We also lubricate it by installing a lubricator on the steam pipe, and practically all of our leakage has been eliminated in that way.

The President introduced Mr. A. W. Zahm, of Mason City, who read the following paper on the

RELATIONS OF GAS COMPANIES TO GAS ASSOCIATIONS.

The subject assigned me is one that I believe has never before been raised to the dignity of a discussion, or of a paper read at a convention, although it has, no doubt, occupied the thought and attention of every individual member. Heretofore the subjects have been mainly on matters pertaining to the purely operating departments of the business, and the technical questions.

I am fully convinced of the good derived from Associations in two ways: First, in reading the proceedings as printed in the various GAS JOURNALS; second, it should really be first and foremost in attending the meetings, taking part in the discussions and absorbing all the good things which your associates have to offer.

This Association was formed for the benefit of the gas industry in this and adjacent States; and as such should, and must, have the support of every gas engineer and manager in this territory, not merely by remitting for their annual dues but by their attendance at our meetings.

A gas association is really a co-operative society, founded mainly to increase our business by improved methods evolved at our meetings; and, second, to promote good fellowship among the fraternity. We gas men are so busy that we have little time to fraternize, so we seldom meet except at these annual meetings.

Before the Iowa District Gas Association was founded very few of the managers, or owners, of gas works were personally acquainted with each other, whereas now we all take a personal interest in each other's welfare. This becomes especially valuable at times of unjust rate regulation, or other drastic legislation, and it is then that we feel that "A friend in need is a friend indeed." We feel free to ask a personal acquaintance for information or assistance, and it is only natural for them in turn to give this assistance to a friend, rather than a total stranger.

If no other good than this fraternal feeling were derived from our meetings, it would be well worth the small expense of our annual dues, yet this is only one of the many advantages which could be derived in no other way without ten times the time and expense taken in this manner. Members can derive more good from attending district gas associations, than the national association, in that conditions in various parts of the district are very similar, and what has been found good practice in one section of the state can usually be adopted in other sections with equally good results.

In this connection I would suggest that the President appoint a committee, with our Secretary as Chairman, to compile "Facts and Factors." The annual report of this committee has been of inestimable value to the members of the Iowa Electrical Association in making comparisons.

The immense amount of gas now used for industrial purposes is indisputable evidence that the field of industrial gas holds great rewards for those who choose to go after it. In every city, large or small, are bakeries, barber shops, laundries, candy stores, machine shops, etc. The amount of gas sold for this purpose, if included in the report of the "Facts and Factors" Committee, would no doubt be very interesting. To this should be added the total number of meters installed, the number of meters per capita, the average consumption per capita, the average number of services per mile of main, and such other data as would be of value to the members in making comparisons.

On the gas company managers devolve the dual obligation of defending and advancing the interests of those who are financially interested in our companies, as well as educating the public mind upon two main points embraced in the words, "Good service at a fair price."

The establishment of confidence between the consumer and the company is all important in promoting the gas industry, and it has become common practice of late for gas campanies to inaugurate publicity campaigns. Good service is a broad term, but we all know what it implies, and that it is one of the first requirements.

Gas managers, to be efficient in these duties, must brush away the cobwebs and at all times keep abreast of the times. The gas business is peculiarly a professional one, requiring high technical skill, and we who are engaged in the occupation of gas engineers and in the management of gas companies, must have knowledge at first hand as to what constitutes the latest and best practice in the manufacture and distribution of gas. This knowledge can best be obtained by attending association meetings and discussing these matters.

Some of the problems which affect us most are those not strictly within the province of engineering. Our greater opportunity for increasing our earnings lies in the development of our market, which is almost purely a commercial problem, where discussions at our association meetings are of very material assistance in obtaining ideas for the "New Business Department."

In conclusion, I wish to bring out one more point that Association meetings offer. They give the appliance manufacturers an opportunity of displaying and demonstrating the gas consuming appliances manufactured by them, and give the gas companies' representatives an opportunity of judging their value, by making comparisons of similar devices, in a manner far superior to reading descriptive matter published in circulars or catalogues.

The President—Perhaps it might be well to leave this discussion until the regular session to-morrow, when we take up the correlated subjects, if Mr. Zahm has no objection. The concluding number for to-day is

THE REPORT OF COMMITTEE ON CONSTRUCTION.

This report was read as follows, by the Chairman, Mr. J. A. Perry:

Your committee has carefully considered the subject of construction, and would report as follows:

First. Water Gas Apparatus.—Air meters, steam meters and electric pyrometers, are now considered necessary to obtain uniform and satisfactory results. Considerable progress has been made towards high capacities now obtained due to these instruments, and also to the enlargement of the principal connections throughout the apparatus.

Coal Gas Apparatus.—Several installations of different types of vertical retorts have been made in the United States during the past 2 years. Apparently considerable labor and first cost can be saved by these installations over the horizontal retorts. The coke is reported to be of much better quality, thus giving the principal by-product of a coal gas plant more value. It seems probable that, within the next 5 years, many more of these plants will be installed. Any company contemplating building a coal gas plant, or rebuilding the present plant, should obtain competent advice and should give careful consideration to vertical retorts.

Attention to Present Plants.—We recommend that especial attention be given to the repair and maintenance of present manufacturing plants. As a rule, great improvements in operating costs can be made by thoroughly overhauling, repairing, and maintaining the boilers, machinery and gas manufacturing apparatus.

Building New Plants.—The progress during the past 10 years has been so great that the advice of competent engineers should be obtained before deciding on new construction, in order that the best plant may be obtained for the money spent.

Discussion.

Mr. Jones—Has anyone present had any experience with vertical retorts.

Mr. Seamon—In Manchester, N. H., they have a bench of vertical retorts on which they are experimenting, but as I have no data in reference to those experiments, anything I could say now would be valueless.

Mr. Perry—The vertical retorts at Manchester have given very good results as to coke, gas and candle power. There are some construction details that are not perfected, but that is only a question of time. Outside of that two other systems are giving very good results, and I think no one should build a coal gas plant without giving thorough consideration to vertical retorts. As to steam and air meters, it happened to be my lot to oversee the installation of these in 2 or 3 works, on small apparatus as well as large; and on small

apparatus they are of more value relatively to the manager, or the man in charge, than on the larger ones, because he can study his conditions and get results from day to day that he otherwise could not get. After he once has his schedule and sticks to it, he can produce results, whereas if you don't happen to have them in the big plants you can approach nearer the results because you have better men following them up. In some of the smaller plants the steam and air meters have brought down the coke consumption of 50 to 150 pounds to under 40 pounds, which is as good as you can expect on a small set not operating all day long.

An adjournment was thereupon ordered.

SECOND DAY—AFTERNOON SESSION.

Business was begun by the adoption of a motion offered by Mr. Clabaugh, appreciating the action of the ladies of the Congregational Church for the entertainment furnished by them, and the Secretary was appointed a committee of one to convey the same. [Vote taken by rising.]

GREETING FROM A SOUTHERN MEMBER.

The Secretary read the following telegram from Mr. George H. Warring:

CHARLESTON, S. C., May 25, 1911.

C. I. Vincent, Sec'y Iowa District Gas Association—Please express to the members of the Iowa District Gas Association my sincere appreciation of the honor conferred upon me in electing me an honorary member of the Association. My best wishes for a successful meeting.—GEORGE H. WARING.

The President—I would like to ask at this time whether it would be of value and interest to the Association to have exhibits at the next meeting, and whether the Council should plan for such an arrangement.

Mr. Crawford—I received a good many letters from different gas appliance manufacturers stating they would like to make an exhibit at Clinton, but as we had never done anything of that kind and had made no plans for it I told them we would get them a vacant room in the hotel, and they could use our office. I think you would have no trouble in getting 30 to 40 appliance exhibitors, and that it would be a very good scheme to have them. I, therefore, move it be the sense of this meeting that a committee be appointed to look after a gas exhibit at the next meeting. [Seconded.]

Mr. Kennedy—If it is decided to hold the next meeting at Lincoln, both exhibit and meeting can be held in the Auditorium, which is admirably arranged for such purpose in connection with the convention. [Put and carried.]

The President—We will now listen to the paper by Mr. E. M. Walker, of Muscatine, Ia., on

DISTRIBUTION TROUBLES.

Trouble has, since the beginning of time, been regarded as the natural inheritance of all men of whatsoever station or occupation; therefore, it is not to be supposed that we in the gas business have any rights of immunity from our full share of them Indeed, sometimes we are led to think that the shares of troubles have been ill-proportioned, more of them falling to our lot than we should have. At any rate we certainly at times have more to contend with than we look for.

A trouble is that which causes disturbance or annoyance, and the word is found in every dictionary. Troubles attendant on the distribution of gas commence at the gas works and extend to the consumer's burner, and have to be met and grappled with by each one on the staff of every gas undertaking.

The business of gas manufacturing and selling has attained the respectable age of about 100 years. Even before the development of the art of gas lighting, as far back practically as authentic history goes, the business of conveying fluids through pipes or conduits had been carried on by our forefathers. Therefore, we cannot go back, even so far as a century, and say, "This is the beginning of distribution troubles such as we know them." And although it might seem we had experienced every variety of distribution troubles, it is safe to say their complete list has not been written.

In the early days of the gas business, when the use of gas was confined to lighting, distribution troubles must have been much less numerous than now. Then only the dark hours of the day gave the gas man much concern. The commercial end of the business was thought beneath the dignity of gas men and was, therefore, left undeveloped. Many cases could be cited of gas companies of many years ago, the meters of which were read and bills rendered quarterly; but under such system little contact with customers could be had, and if there were a complaint window it was certainly hard to find. It is safe to say this conservative period of the gas business together with the attitude it developed amongst gas men of the time, was largely responsible for the many jests about which the gas man and the gas meter were the subjects.

An evolution, in fact a revolution, has taken place so that the many hundreds of uses for which gas is now sold have brought abou a condition that makes the gas man, like the physician, subject to call at any time—all through the night in the printing offices, and all through the day in the shops where gas is being used for a variety of industrial purposes; at meal times in the home; in the laundries day and night—gas is being constantly employed and its distribution must be carefully watched every hour of the 24. It is easy to see, then, how, under such an evolution, from the use of gas simply as an illuminant to the almost endless variety of uses for which we sell it to-day, distribution troubles have increased and have acquired an ever increasing watchfulness and skill in meeting them.

Early literature on the subject of gas was confined principally to the manufacture and storage of our product, and had comparatively little to say of its distribution, beyond the actual distribution system or the street main system and the consumer's meter. Very recently an English authority (Walter Hole) has gone into the subject in an exhaustive manner. In his work on "The Distribution of Gas," which is worthy a place in the library of every gas man; he has covered the subject of distribution troubles in such thorough and painstaking manner that his book cannot fail to be helpful to the student. The writer of a short paper, such as requires but a few minutes in the reading, cannot be counted on to go into technical details in an attempt to cover the list of "Distribution Troubles," further, it is not the scope of this paper to catalogue every variety of trouble encountered in the distribution of gas. The most we can hope to do, in the short time allotted, is to mention a few of the everyday troubles which vitally affect the success of the business; that is, the output of gas.

The maintainance of adequate pressure on the distribution system is of great importance, and care must be taken that all districts supplied are well supplied. Care must be taken that, in the extensions of mains to new districts, the gas supply will be ample for the maximum demand of the meters connected. To this end frequent inspections must be made and pressures taken at the hours of maximum sendout and new business must be carefully watched to see that its demands do not exceed the capacity of the existing mains to supply.

Many appliances are now sold for household use which have large gas consuming capacity though used but a short time each day. These call for a careful watch as to the size of the meter installed, and, as to the size of the house piping, that they may be equal to the demands of these appliances, therefore eliminating annoyance in the attempt to use them. In this connection it is important to secure the co-operation of the plumbers, who, for example, sell and install large capacity water heaters, so that they may determine that the size of the meter or service pipe is increased if such should be found necessary.

In the matter of lighting it will be found that consumers as a rule are apt to neglect their incandescent lamps which results in the poor lights usually blamed to the quality of the gas. This is a prolific source of trouble and must be watched with diligence. A system of regular weekly inspection can be undertaken and consumers interested in it on account of its low cost, whereby this class of trouble can be greatly lessened. The system itself can be made self-supporting or even profitable, depending upon the number of inspection contracts secured. We will assume that the mains are well mapped out and well and carefully laid. Also, that they are of sufficient size and that service pipes are properly installed and of sufficient size. We will assume that the meters are carefully looked after so that their accuracy is maintained for the periodic inspections and tests. For these are prolific sources of distribution troubles, and if they are not as assumed the trouble arising from them operates as a continual impedance to the development of the business to its full possibilities. The future success of the gas undertaking lies, first, in seeing that these wrongs are made right.

Without neglecting or wishing to minimize the troubles which arise from technical or mechanical causes, perhaps the most fruitful source of distribution troubles is the lack of a complete understanding or rather a close relation, between the gas company and the public it serves, and the neglect of a gas company to bring about that close relation. Seemingly little things, such as teaching consumers to

read their own meters, explaining to them the mechanical construction of the meter, for instance, are steps in the right direction. A well-lighted showroom where customers may be shown the different possible uses of gas, and where may be explained how to economically use the different appliances, and to keep them in proper adjustment; to have courteous and intelligent clerks in the office, each one of whom is a "new business man," interested in seeing that the customer gets what he wants. Again, prompt attention to all complaints however trivial, and a readiness to explain the source of the complaint and its remedy; accessibility of the gas office to its patrons at all reasonable times—all of these are potent factors in keeping troubles down and that is the end to be desired.

As hinted at the beginning, it is not to be hoped that troubles can be entirely dispensed with; that would be hoping too much. It is, however, possible, by watchfulness and diligent care, to keep them to a minimum and, at least by strict attention to business, to eliminate all the unnecessary troubles. Certainly this diligent attention to the details of distribution, only a few of which have been touched upon in this short paper, will have its reward if it enables the gas man to make light of his troubles instead of having trouble with his lights.

Discussion.

Mr. Green - In the paper I am to read you will note that I mention something about high pressure. Mr. Walker's remark about the care that must be taken to see there is a proper amount of gas in all sections of the town, and to make very frequent tests to see that people installing water heaters and other appliances, taking large amounts of gas have ample services, etc. I am frank to say we have none of those troubles. We carry ½ pound pressure on the mains with individual governors, and while we have none of the large water heaters, yet I am confident that our service would take care of any ordinary house with a range, the usual number of lights, and a large heater.

Mr. Tenney—At a recent visit to the city of Ames, where is located our Iowa College of Agriculture and Mechanic Arts, I saw in use 46 hot plates and three large ranges (such as would be used in hotels) in one building. I understood that there are five other buildings using gas at the same time. We went from the "Domestic Science" building just spoken of to the "Chemical" building, and there were 500 bunsen burners. That gas is all supplied through a 2-inch main 2 miles from the works proper. We have 2 pounds pressure up to the governors.

A Member—"Distribution troubles solicited" is a motto that may cause expense, but it will bring good results, because it will make more satisfied customers and increase consumption, an end we always desire to attain.

The President—We will now have the paper by Mr. George A. Green, of Cherokee, on

PRESSURE REGULATORS.

The request by your programme committe for a paper on the subject of pressure regulators seems a clever method of granting a rehearing of the case of high pressure versus low pressure distribution. By whatever name a gas plant may be called the same smell will always arise from it, and whatever title this interesting subject may receive the same discussion will arise. The subject of pressure regulators itself pre supposed the use of high pressure of some sort. As a matter of self-protection I shall confine my remarks to my experience with pressure regulators such as we use, rather than enter upon a discussion in general.

Five years' experience with high pressure distribution, and a like period of intermingling with men who have used low pressure, who in moments of reflection or excitement, have confided to me some of their troubles and woes, have led me to conclude that high pressure distribution in small cities and towns, properly handled with pressure regulators, offers a panacea for many of the ills that low pressure distribution is heir to, and a positive cure for many of the aggravating, trouble-making ailments that have become chronic in so many cities and towns where low pressure distribution is used.

In Cherokee we make gas direct into a small 3,500 feet capacity relief holder. Our compressor draws the gas from the relife holder through the purifier, and compresses it into tanks capable of standing a working pressure of 125 pounds, if required, each tank holding 10,000 feet of gas at a pressure of 80 pounds, which is about as high a pressure as we usually carry. From these thanks the gas is released through a governor or pressure regulator, which we will call, for convenience, the high pressure governor, which reduces the pressure to about 7 pounds. It then passes through another regulator called the low-pressure governor which reduces the pressure to ½ pound or 13 inches of water, which we carry on the mains at all times. At the service, on intake side of the meter, we place individual governors which reduce the pressure to about 3½ inches. We have over 9 miles of mains, the largest of which is 4-inch, and the smallest 1¼-inch, with the exception of a few 1¼-inch stubbs. We now have a few over 400 customers.

During our heavy season we send out from the plant 30,000 to 50,000 feet of gas each day. Frequently the hourly output during the peak load will run as high as 7,000 to 10,000 feet. Under our heaviest load we have never had any trouble to furnish plenty of gas at the 3½ inches pressure in all parts of town. Last summer, during the heavy cooking season, we made some tests during the high load of the day at 20 or more places about town, most of the places being at the end of stubb mains, or in the center of the heaviest gas consuming district. In fact, we selected the places where we thought we would be liable to find the lowest pressure under the circumstances. The lowest main pressure we found was 7 inches of water at the end of a 1¼ inches stubb, and about a mile from the plant. The pressure at the plant at the same time registered the usual 13 inches. At the other points about town the pressures ranged from 7½ inches to 12 inches, depending on the location.

This test thoroughly satisfied us we would be able to handle double the amount of business with the same mains; and, on account of the very favorable arrangement of our system we can, with about 1,500 or 2,000 feet of 2-inch pipe, tie up nearly all the stubb ends I have referred to, and put in one or two short runs that would connect up our general system in such a way that the circulation will be greatly improved, and thus enable us to care for probably four times the present output with our present mains. With such a system it is perhaps needless to say that we must have pressure regulators that work successfully 24 hours each day. We have in use about 400 individual regulators that cost us about $1.90 laid down in Cherokee. The price seems cheap, but thus far these regulators have worked satisfactorily. Occassionally we find a broken diaphragm; but, aside from that, they give us practically no trouble. These governors afford an even, constant, and ideal pressure for both stoves and lights at all hours of the day. The governors at the plant have caused us a little trouble. We once had a temporary suspension of the gas business in Cherokee on account of fine dust and dirt collecting on the screen at the intake of the high pressure regulator, thus shutting off the gas entirely. We experienced this trouble a few days after putting new oxide in the purifier, and it necessitated running the gas through a ¾-inch by-pass direct from the tanks to the main, controlling the pressure with an ordinary valve, while the screen was being cleaned.

Another trouble we have scented is the possibility of the full tank pressure breaking through both governors and getting into the mains. Your bump of imagination would show a sad lack of proper development were you not able to picture our plight the morning after 80 pounds or 100 pounds pressure had suddenly been turned loose on the mains, when you realize our individual governors will not stop over 5 pounds pressure. As yet we have not experienced the sensation of such a catastrophe—but, almost. One morning not long ago our gas maker found our high pressure governor dead, a hoarse, rasping, ghastly, rattle emanating from its interior, while the gas under a 50 pound pressure whisked merrily through the corpse. Fortunately for us the low pressure governor caught the load, although it was not warranted to handle over 20 pounds or 25 pounds pressure, and held the main pressure at the customary 13 inches. An examination of the broken governor disclosed the iron diaphragm weight broken in 7 or 8 pieces. To prevent the possibility of what might have happened, we immediately installed 2 high pressure governors tandem in the place of the one we had before. The first one we set to reduce the pressure to 8 pounds, the second to 5 pounds, while the third governor, which is the same low pressure governor we had heretofore, reduces the pressure to 13 inches. Should one of the high pressure governors break now we have the other one to handle the load, thus reducing the possibility of an accident to a minimum. It is highly improbable that both governors would break at the same time, as a flaw in the iron is about the only thing that would cause such a break. That arrangement of high pressure governors also enables us to eliminate the possibility of trouble caused by the screens filling up. Both of these governors are so by-passed that we can use either one, neither one or both. It is but a short job to cut off one of the high pressure governors, take

(*Continued on page* 42.)

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NOTICE TO ADVERTISERS.

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NEW YORK, MONDAY, JULY 17, 1911.

[Official Notice.]

Wrinkle Department, American Gas Institute.

Wrinkle Department, American Gas Institute,
Office of Editor,
Denver, Col., July 5, 1911.

To the Members, American Gas Institute: The Editor of the Wrinkle Department, believing that the members of the Institute, in selecting him to direct this important division of its affairs, were also alive to the necessity of aiding him in the routine work connected therewith, takes occasion to ask now for this assistance. The meeting time is not so far from to-day that inaction will be unimportant. He, therefore, invites, in fact, solicits, suggestions from the members as to how this work may be best carried on, and hopes—believes that valuable as the contributions to the department have been, the scope thereof may be still further enlarged. He will gladly receive matter related to any wrinkle that has been smoothed out in the narrator's experience; and those interested need not think it at all fundamental that the recital of their experiences should be co-related to higher mathematics, to abstruse calculations, or to the revealing of something absolutely new. Any matter describing a new, or seemingly new, way of getting over an old difficulty, is acceptable; yes, is welcome. Send in your description in your own language, and if there is any need of "touching it up," that is why the Editor is on the job. Whenever illustrations are to accompany the text, see to it that the drawings, sketches or photographs are in black and white. Get your story in shape and forward the same as soon as possible to

Gas and Electric Building, A. F. Traver, Editor.
Denver, Col.

[Official Notice.]

Experience Department, Pacific Coast Gas Association.

Pacific Coast Gas Association,
Office of Experience Editor,
San Jose, Cal., June 24, 1911.

To the Members: The Nineteenth Annual Convention of the Pacific Coast Gas Association will be held in Oakland, September 19, 20 and 21. The Experience Editor of the Association is in despair. Cast him a line; come to his rescue, for he needs help. To the notices sent out by the Secretary, few have replied.

We know that every gas man has had at least one experience during the last year that would be of interest to us all. Will you kindly respond at once? We know you are busy; gas men always are. And busy men have many experiences worth telling.

Sincerely yours, John D. Kuster,
48 E. San Antonio street. Experience Editor.

BRIEFLY TOLD.

A Happening on the "Duchess of Hamilton," Somewhere Between Broomielaw Bridge and Gourock.—The final number on the outing programme of the meeting last month, in Glasgow, Scotland, of the Institution of Gas Engineers, was a trip over the famous Clyde river and its concatenations, from Broomielaw Bridge to Gourock. To say that it was enjoyable—this going past, on and through scenes and scenery, written descriptions of which teem on the world's records, in guide books and story and song—is saying the very least. As guests bearing the sign manual of North America, the Institute had two, in the respective persons of, Mr. J. C. Moon, Manager of the works at Vancouver, B. C. (by-the-way, Mr. Moon is really a member of the Institution) and Mr. H. L. Doherty, of New York. During this "boating" one of the snapshots resulted in the taking of the accompanying photograph—it is regrettable that the picture is dim, owing to the peculiar light in which it had to be taken:

Mgr. Vancouver (B. C.) Works. Mr. J. C. Moon, | Pres. Institution. Mr. A. Wilson, | New York. Mr. H. L. Doherty.

For our abitity to reproduce this group we are indebted to the *Gas World*.

Lighting Maintenance.—"Maintain," according to Webster, means to keep up; also, not to surrender or relinquish. The first mentioned definition is plain enough, and if its application consists of having a schedule of maintenance rates, without an active campaign to convince consumers of its advantages, why the managers of the property, being in the "obsolescent, inadequate and decaying" class, should be "scrapped." Respecting the second definition, we find it applies to those cases in which there was an active effort to introduce the maintenance system, but where the type of lamp had passed its day of usefulness as a light producer, though still in good condition from a mechanical standpoint. In these days the useful type of a lamp is generally less rather than more than 10 years, and as they are usually put out on a basis which shows a profit on the right side of the ledger, they should be scrapped and replaced by a more modern type as soon as they have outlived their usefulness, for a lamp may operate satisfactorily and yet have passed the useful period. This condition is exemplified in the case of upright lamps, which, unless replaced by the inverted type, will leave the consumer in more pliable mood when approached by the "engineering solicitor" of an electric competitor, or, possibly, afford an opening by which the ingress of a gasoline agent may be made the easier.—Lumino.

A Double Farewell to Mr. Alten S. Miller.—On the 24th ult. a farewell dinner was tendered to Mr. Alten S. Miller, President of the Union Electric Light and Power Company, of St. Louis, Mo., by the

employees of the Company. At this dinner an album was presented to the guest of the evening, which contained photographs of various members of the organization; also of the plant and property of the Union Electric Company under Mr. Miller's direction. On Tuesday, June 27th, the League of Electrical Interests, St. Louis, also gave Mr. Miller a farewell dinner, at which many nice things were said regarding the relations between Mr. Miller and the League during the 2 years he was in St. Louis. Mr. Miller came to New York, July 1st, entering the Corporation of Humphreys and Glasgow, the name of which henceforth will be Humphreys and Miller. Both members of the firm have been long and favorably known to the gas industry and have advised in, and had charge of, much important work in the gas and electric business. The success of the new firm is in no sense problematical. In fact it was assured from the start.

CURRENT MENTION—

In our Item Columns will be found a brief statement respecting contracts awarded in connection with the construction of the new plant for Temple, Tex. Since that was written we received the following pithy mention respecting the enterprise, from "H. A. W.," under date of the 10th inst.: "The Temple Gas Light Company has been incorporated under the laws of the State of Texas, with an authorized capital stock of $150,000, for the purpose of building a gas plant in the city of Temple. Of that amount, $80,000 has been paid into the treasury of the Company. The corporation was formed by Mr. Henry M. Wallace and associates, of Detroit, Mich., who also own and operate gas plants at Iron Mountain and Ironwood, Mich., and at Hurley, Menominee and Stoughton, Wis. The officers of the Temple Gas Light Company are: President, Henry M. Wallace; Vice-President, Raymond G. St. John; Secretary and Treasurer, William T. Utley. Contracts have been awarded to the Kerr Murray Mauufacturing Company, Fort Wayne, Ind., and to the United Gas Improvement Company, for the necessary apparatus for the operation of an up-to-date water gas plant. The Company holds a 30 year franchise, granted during the past 3 months, authorizing the sale of gas at $1.50 per 1,000 cubic feet. Temple is a city of about 12,000 people. The services of Herbert L. St. John, formerly with the H. M. Byllesby Company, of Chicago, have been secured as engineer, and he will have entire charge of the construction work. The Company will lay about 12 miles of mains this year, ranging in diameters from 12 inch to 3 inch."

Mr. P. R. Seaman, Manager of the Automatic Lighting Company, of Boston, informs us that the Company's headquarters are now in 84 Portland street, instead of in the "Old South Building" as before.

The proprietors of the Bethlehem (Pa.) Steel Company, of South Bethlehem, Pa., have contracted with the East Penn Gas Company to run a pipe line to all the towns along the Reading (Pa.) Railroad, from the Philadelphia city line to supply the towns so hooked up with gas from the coke ovens.

At a meeting of the General Council, Louisville, Ky., held the 5th inst., the following gentlemen were appointed by Mayor Head to succeed themselves as the city's representatives on the Board of Directors, Louisville Gas Company: James B. Brown, W. J. Abram, F. A. Gehr and John H. Whallen.

The Federal Gas and Fuel Company, Columbus, O., has decided to carry to the Supreme Court for error, the proceedings respecting the decision of the Franklin County Circuit Court, which decision upheld the provisions of the franchise contract, under which the Company pays to the city 10 per cent. of its gross receipts from gas sold in excess of 15 cents per 1,000 cubic feet. This action seems queer in view of the fact that the original decision was regarded as a complete and positive victory for the city, under which Mr. R. M. McCoy was appointed Master Commissioner to ascertain the sum due May 22, 1899.

Mr. J. T. Burch, writing from Edmonton, Canada, incloses the following under date of July 3d: "Following the action of the Council to investigate the matter of having a gas plant installed in Edmonton, no less than 4 applications have been made to obtain like rights. The latest came from the Starr & Reed Company, of Philadelphia, Pa., and it is likely their proposition will come up for consideration at the next regular meeting of Council. On June 29th Mayor Armstrong received a telegram from the Philadelphia firm asking that they be given a chance to submit a proposition. In the message it was asked that the terms of the C. S. Eaton agreement be submitted to them, as they wished to give better ones, if practical. The telegram read: We are advised that the matter will be closed with Eaton. Wire us terms of Eaton agreement as we desire to bid. Will give better terms than Eaton. The first communication from Messrs. Starr & Reed was received by one of the Commissioners, who asked an early reply to a letter that had been sent to them. No such letter could be found in the files in the Commissioners' office, whereupon the Philadelphia gas men were advised of the fact. On receipt of this letter they wired asking to be given a chance to submit a proposition, and that they would send a representative to Edmonton. This message was handed to the Mayor, and he also received another one yesterday afternoon. He stated this morning he would bring the matter before the Council at the next night of meeting. This, of course, will sound rather mystical to the practical gas men who read your paper, but it is here given as a sample of the way the Mayor and his bunch have been bamboozling capitalists—notably a most reputable concern from Montreal—for a gas franchise at this point. If the authorities are only allowed full swing in the premises they will undoubtedly hook up with a bunch of buncoers of the amateur gas type, who, when they have loaded the city with one of their outfits, will speedily quit Alberta for parts further south. Then, having awakened to the fact that they have been buncoed, the Fathers will likely have sense enough left to appeal to reputable firms in either the States or England for aid and a gas plant."

"M. M. W." says that certain local capitalists of Nashville, Tenn. have applied to the authorities of that city for the right, through the medium of the newly incorporated Nashville Gas and Heating Company, to purchase any or all of the properties of the Nashville gas works, for operation thereafter. The incorporators are Messrs. J. H. Fall, Edwin A. Price, C. H. Brandon, Thos. W. Wrenne and John Moore. Uunder the franchise asked for in the bill the city retains the option to purchase the plant and properties after 30 years on 12 months' notice, and does not waive its right to build and operate a plant of its own at any time. The existing Company holds a franchise for 14 years, hence the new would mean an extension of 26 years. For this franchise the Company agrees to pay the city the sum of $100,000, and that not in lieu of special and privilege taxes as asked for under the recent proposition of the Nashville Gas and Fuel Company. It proposes also to give to the city 5 per cent. of the gross receipts from the sales, not only of gas, but also of all the by-products eliminated from that clause of the Gas and Fuel Company. Furthermore, it agrees to sell gas to the city, a good commercial product, 16-candle power, at not exceeding $1.10 per 1,000 cubic feet for the first 10 years, incorporating also a provision for fixing the price at the end of each 10-year period by arbitration, a provision not incorporated in the other proposition, and as against the original proposition of a minimum charge of 50 cents to consumers, this plan specifies a charge of only 15 cents.

Mrs. S. E. Craig, the well-known domestic practices demonstratress, is completing a series of lectures on cooking by gas to the residents of La Fayette, Ind., under the auspices and direction of the Indiana Lighting Company. Despite the prolonged, intensely high heat degree condition of the atmosphere, the lectures were attended by hundreds, the interested ones frequently overtaxing the capacity of the Company's by no means restricted office quarters. The enthusiasm of the students was unabated, which is not to be wondered at, remembering that the demonstration was proving every minute that the rigors of high temperature were as far as culinary practice is concerned, almost put to route by means of gaseous fuel—comparatively at any rate, in great measure. The lecturer goes from La Fayette to Fort Wayne, the gas supply of which place is also under the dominion of the Indiana Lighting Company.

The story of "Making a Mantle," as retold in splendid fashion on the pages of a pamphlet bearing that title, just to hand from the Gloucester (N. J.) press of the Welsbach Company. The title and theming thereon are not altogether new, in that this tome is a reedited one, as to text. However, the printing is completely along new lines, the work having been done under the "off-set" process. This is an expensive method, but the game is certainly worth the candle in this instance, for the booklet is a gem, considered either from the standpoint of the reader interested in modern gas lighting devices or in the art of beautiful printing.

The Directors of the Washington (D. C.) Gas Light Company have declared a dividend of 6 per cent. for the last quarter, thus putting the stock on a 24 per cent. per annum basis. It was made payable the 1st prox. The Company is preparing to pipe the outlying district, known as Congress Heights.

(*Continued from page* 39.)

it down and clean the screen. By seeing that this is done every few weeks the trouble caused by the clogging is done away with.

The probability of getting extreme high pressure on the mains is, to my notion, one of the greatest objections that can be found to high pressure distribution; and, permit me to say here, that thus far I have failed to hear this objection advanced by any of the strong adherents to the low pressure idea, who so frequently find fault with our plan. High pressure distribution as we are using it is comparatively new, and is a proper subject for all critics, most of whom are men of long experience with the low pressure. As they have seemed to overlook one of its serious drawbacks, it is not possible that they have failed to realize all its benefits, and I would take the liberty of recommending to them a little practical experience with high pressure before they condemn it too strongly.

In conclusion I would simply like to mention some points that recommend the high pressure system to me.

First: The original installation of mains and gas holders is much cheaper than with a low pressure system of the same capacity, so much less that the compressing of the gas will cost much less than 5 per cent. interest on the difference in the cost.

Second: The service that we render to the customer is equal to any, and superior to many, of the gas companies in towns of same size where the low pressure system is used. We reached this conclusion not from our own experience but from the common comments of our customers who have used both.

Third: That our pressure is always even.

Fourth: That we have eliminated all freezing and congealing of the gas in the mains and services, and to this I might add that I firmly believe, although I have no accurate figures with which to prove it, that we can manufacture and deliver gas to the customer at as low a cost as can be done by the average low pressure plant in towns of 5,000 people, taking into consideration the difference in the cost of the raw material.

Discussion.

A member—What type of individual governors does Mr. Green use that cost $1.90 apiece.

Mr. Green—Reynolds' governor; I do not know the number.

Mr. Smith—To most members using a low pressure system this talk would not be very interesting, so I will speak as briefly as possible. Men with small plants have a layout similar to that Mr. Green mentions. As to his trouble in getting high pressure on the main, I think there is no danger whatever on such account. Most governors that I installed have a mercury individual seal, so that anything coming upon that governor which would create a higher pressure in the governor than 4 inches would blow on the outside of building. We carry ½-inch pipe from the governor to the outside of the building, leading it to a 4-inch pressure, so if anything goes wrong with the station governor, or from carelessness of the employees opening the pipes, it is caught at the mercury seal at the house, and pressure blows outside. If anything were to happen about his governors, they would simply drop down and shut off, therefore the pressure is entirely eliminated, provided care is used in the installing. As to to freeze ups, we have 460 services in use on high pressure, with 2½-inch pressure on the meters, and had only one freeze-up last year. In several other cities where I have friends, I have gleaned a good deal of my gas experience, but last winter I found them too busy to talk. They had troubles that made me almost want to turn in and help them, because I told them I had nothing to do.

Mr. Fair—What does that service governor which he describes stand Mr. Green. That is a pretty far cry from $1.90; isn't it?

Mr. Smith—The governor installed costs about $2.50.

Mr. Fair—Mr. Green's paper contained a great deal of information which to me is valuable. I have had no personal experience with high pressure distribution, and if I am not mistaken Mr. Green has not had any with low pressure. My experience is that in small plants with low pressure distribution we have never had at any time any suspension of gas. The first cost of Mr. Green's plant being undoubtedly less than in a low pressure distribution plant, which would necessitate a holder and large mains, it seems to me the proposition narrows to a reduction of the first cost at the expense of future operating expenses, and possibly damage claims. If gas is shut off from a town once a year, even for a matter of ½ an hour or less, you are laying yourself open to possible claims that will more than offset 5 per cent. interest on the difference between your investment and mine. In passing how does Mr. Green turn on the gas again after suspension. Does he just turn it on, or does he give warning in some public way that the gas has been turned off and will be turned on the pipes at such a time.

Mr. Perry—I don't see why there should be trouble with high pressure governors, or that they cannot be made safe. With natural gas governors are installed in duplicate, with a screen at the end of each governor; besides they install a blowout with an oil-seal which will not yield more than so much pressure to the consumer.

Mr. Kennedy—What did Mr. Green's governors cost, installed?

Mr. Green—35 and 50 cents in addition to the cost of the governor.

Mr. Kennedy—In Lincoln we have a high pressure distribution system which has grown up from a low pressure one, and we have individual low pressure governors; that is, they have a ¾ inch opening full, and on off-peak hours we run on holder pressure where we haven't over 5 inches of water. Over the peak we run our booster to raise the pressure in excess of 25 inches; then, from our district holder, we have a blower for the suburban towns which we supply. We have the low pressure on the individual services with a full ¾-inch opening. On the high pressures, that I take it Mr. Green and Mr. Smith use, they have an opening through the governor of only $\frac{5}{16}$ inch. To me it seems that small opening will clog up, and I would like to know what trouble they have had along such line.

Mr. Tenney—I can name to Mr. Fair 20 high pressure distributing plants in which the gas was never off the main. I would like to ask Mr. Fair what would become of his holder proposition, provided it will not pump his drips from his outgoing pipes every day? Answering the suggestion of Mr. Green that the failing in his governor with clogging at the time he filled the purifier, indicates to me that he is not wetting his oxide, which all gas men know should be done; and he should adopt that method. Undoubtedly he is pumping dust which clogs the governor. When it comes to the matter of safety of service, there is no argument the low pressure man can offer over high pressure. In fact, taking freeze-ups and condensation of services into account, I think where we have one trouble they have 100.

Mr. Jones—We had some trouble with house governors on our line from Waterloo to Cedar Falls, from which some of the farmers take gas, and on a few of the outlets some scale seemed to get under the valve. We use an ounce of mercury, and have had some of those blows, but otherwise we have had no trouble at all on that line from governor causes.

Mr. Maynard—It was my privilege, and that of Mr. Smith, who is now with our Company, to be working for 3 years for a company that employed both systems. One town they served had about 15,000 population, and probably half of it was served under the old construction with the low pressure. When the plant was taken over by other parties, the development was all made on high pressure lines; that is, the older part of the town was served with low pressure and the newer with high pressure. Then we had 3 towns from 5 to 7 miles out that we served entirely with high pressure. My work brought me in personal contact with the consumers, and in those 3 years I don't remember a single accident with high pressure lines. I don't remember that we even had any freeze-ups; but I do know that most of the cold weather troubles occurred on the old low pressure system. The fact that on our high pressure system they had uniformity of pressure and service to my mind made the system ideal. Mr. Smith was in contact with the distributing end of the business; if he remembers anything to the contrary I would like to have him speak of it.

Mr. Smith—We had no trouble, practically, with the high pressure system. We eliminated one expense of the periodical pressure of pumps, which applies to low pressure and not to high.

Mr. Kidder—On this proposition of high or low pressure system, it appears those who favor the former have their say so to day, but I notice they have not entered into the cost per 1,000 for compressing the gas. Mr. Green notes in his paper that the saving would pay 5 per cent. on the difference in cost of mains. It seems to me it resolves itself into the fact of how far the mains have to be extended to get to the consumers. If one had to go a long way to get to the consumer, the high pressure line would get there quicker.

Mr. Bertke—Another point overlooked is that, no doubt the leakage increases as you increase the pressure in the mains; likely though high pressure is the best in a good many cases.

Mr. Smith—Speaking about saving 5 per cent. on the laying of mains, in some western towns we run a service and do not expect to have over one house on it; but after a while we find that some other fellow has built a house 300 feet away. Not wanting to pull up the pipe and lay a bigger one, we keep hanging on. I have 11 services

off which the monthly consumption averages about $3.75 on a ¾-inch pipe, and have no trouble in giving good service. In the city a good many meters are working along on a ¾-inch pipe, for the reason that the houses were simply piped for illuminating only. But the residents having gone to housekeeping in the block temporarily, we raised the pressure on the governor on ¾-inch pipes, and have had no difficulty at all in supplying them. We have no trouble from governor stopping up. Dust from oxide getting over in the governor shows merely a defect in construction on the part of the man who set the governor. He should have used a tee and a drip pipe, the same as you people put on the end of your service. The dust would have been precipitated on that and could have been blown out.

A Member—Referring to leakage, it seems to me the difference is in laying low pressure mains with caulked joints and high pressure mains with screw joints. The expansion and contraction of the caulked joints are undoubtedly the causes of leakage in the low pressure system.

Mr. Wrisgerber—We have a high pressure line at 15 pounds which supplies a city 8 miles away and a little town of about 500 inhabitants is overrun with ¾-inch mains. We had this winter very little trouble with our high pressure main system. If high pressure is laid with the right kind of engineering ability, a lot of distribution problems are solved. Most distribution troubles come because we don't know where these real estate boomers are going to start next. In Cedar Rapids we have over 3 miles of mains in a territory where no one was ever expected to even build a house. To reach this territory, which is a section of town between the old and the new, we have a lot of small mains, and we have solved the problem by high pressure distribution. It was the same way in the natural gas business with which I was connected for quite a number of years; instead of laying large mains a high pressure system was put in and it solved any number of troubles in a great many of those cities. As to leakage, if the joints are laid properly, with a little bit of good sense, one will find leakage in high pressure is much less than in low pressure. I was brought up in the latter business, but have handled high pressure mains where we had 250 pounds on a 20-inch line, so I know something about high pressure gas. When we had trouble in keeping the gas and oil in the high pressure main we solved it by using shellac at the joints. I got a letter not long ago in regard to a line that I laid over 11 years ago, and the man in charge says his leakage is less than the average. Both systems have their advantages and disadvantages, and I would like to hear a paper sometime on a comparison of the two, upon their merits.

Mr. Runner—I have had some experience with high pressure, and a point not brought out here is high pressure mains should be graded same as the low pressure ones. When he began to put in high pressure lines a few years ago, we were told we didn't have to grade, but in my experience, where one uses from 15 to 30 pounds the mains should be graded in order to take out the accumulated condensation.

Mr. Weisgerber—I was connected with the company which put natural gas to Cincinnati, and a mammoth job it was. Originally it was decided that no drips were needed, but afterwards it was found we needed drips for the high pressure distribution. In only one place have I had trouble with high pressure gas, and that is where the main is laid too shallow, and there is practically no flow of gas during the winter months. We have less trouble with the high pressure than with the low in cold weather, and still have to find a stopped-up service in the former, but I have had them on 1¼-inch low pressure service.

A Member—Do you use drips all through the line, or just for a certain distance from the works?

Mr. Weisgerber—We put a drip in low places.

Mr. Green—There is not very much more for me to say. Two years ago I had to do all the saying in reference to high pressure, but I note quite a number have come to my rescue. A thing Mr. Fair brought up refers to cutting off the gas. I do not wish to figure as an alarmist, and did not put those matters into my paper for that purpose; but I really felt I could not spread it on too thick, and so I put in the worst that I knew. The cutting off of the gas was not the fault of the system at all, but our "gas house terrier" did not put in the screens as he was told. Had that been attended to we would not have had trouble. As to the possibility of getting high pressure on the mains, I think it is very remote indeed; in fact, I never thought of it until the morning when I discovered the broken regulator. We all have to learn by experience, and that is the only way I ever learned anything about the gas business. I never heard of any other governor breaking, and know of a great many being used. I mentioned this as a possibility. It is somewhat of a misnomer I am sure to call our system a high pressure one. It is rather a system of compressed gas with medium pressure on the mains. We tried the drips for 1 year with a pump, but didn't get anything. They haven't been looked at now for 3 years. Someone spoke about the cost of compressing the gas. As near as I can make out it costs less than 5 per cent. interest on the difference between the cost of our mains and our compression tanks, and the mains and holder that we would have to give a reasonably good service under a low pressure system. We can't prove it accurately, but I have figured it out so I think my statements are very nearly correct.

A Member—Mr. Green figured this out, and I would like to ask what is the cost per 1,000 feet.

Mr. Green—That must be considered with reference to output. You can't take any particular plant and figure it out; it varies every year. Take a plant of certain output, and figure the amount of water and fuel, then you will arrive at it accurately. It is lower on our system though using waste heat from the generator to run through the boiler to treat the water.

An adjournment was ordered to the following morning at 10 o'clock.

THIRD DAY—MORNING SESSION.

The final session of the convention was held at Eagle Point Park, 4 miles north of Clinton, cars thereto having been taken at Lafayette Inn at 10 o'clock. Promptly on arrival at the park the convention was called to order by President Burt, who called on Mr. Walter M. Blinks, of Kalamazoo, Mich., to read his paper on

INVERTED GAS ARC LAMPS,

which was as follows:

Gas Sales.—This is the tenth year of the gas arc lamp, which, measured by the 20th Century rate of progress, is a considerable period. Many of the lamps sold in 1901 are still in satisfactory service, and the demand for gas arcs has been a steadily increasing one ever since. There are probably two million in use in the United States now. Estimating their annual consumption of gas at the low average of 20,000 cubic feet per lamp, we get the enormous output of 40 billions cubic feet, or $40,000,000 worth of gas sales per year, resulting from an investment of about half that sum in the fixture itself, all expenses of installation included. If this can be even approximately approached by the results obtainable by a similar expenditure along any other line of gas or electricity promotion work I am not aware of it.

Gas lighting has passed through several crises. In the year 1880, as a youngster, I had my first view of an electric arc light, and so vivid was the impression produced that I recall the whole scene distinctly. The lamp was suspended from a flag staff surmounting a large store, its only function being to attract attention. In this it was entirely successful, and in that crowd of spectators I heard my first warning of the "impending doom" of gas. A year or two later some of the family savings went to purchase an interest in the gas works of the town where we lived. The wise ones said it was almost throwing money away to make an investment like that in a business so soon to be trampled in the path of progress. When incandescent electrics began to make an impression on gas sales, the gas mantle was perfected and its brilliant rays put the red wires of the opposition to further blush.

As the demand for more and more light grew the number of single burners was increased and competition troubled us not. The inclosed electric arc came, a business-like looking fixture, without frills or claim of beauty, but it gave a good light on vastly reduced current consumption per candle as compared with the carbon bulbs. Merchants were enabled to dispense with the cumbersome gas or electric fixtures which in the best lighted stores often gave the appearance of a fixture display rather than a lighting accessory.

In my own case it got so that the only way I could start the day's work in a proper frame of mind was by taking the back street to the office and so avoid seeing our competitor's linemen stringing wires up to another choice consumer's businees place.

A compact, high power lamp was the fashion. We didn't have one, and our most skillful efforts to satisfy with single burners did not avail. Commercial business was going with a rush when the Humphrey arc came, and I for one walked to work again down the main street.

Conditions, however, were not the same all over the country. The single burner installations that failed utterly to keep the business for some of us who faced particularly keen electric competition seemed

to hold out elsewhere surprisingly well. While the gas arc lamp was probably accorded more enthusiastic recognition than any other appliance ever offered the gas industry, its reception was not entirely unanimous. Some people objected to the name, but it was frankly admitted that etymology hadn't been considered so much as the desire to get a good, expressive title indicating the article's mission in life. Others were ardent champions of small units on grounds of theoretical light distribution, forgetful of the fact that the one source of perfect illumination in this world of ours, "Old Sol," is some classy, high-power unit himself.

We formerly went to considerable trouble to show that the gas man who attempted to follow electrical practice in laying out his lighting scheme with single burners would very soon be brought to a realization that the control which his electrical brothers accomplished with ease and exactness he could only do with effort and untainty which could not long be disguised to his customer. In fact, we advocates of high power gas units had to keep up a strenuous propaganda in the face of the clever sophistries of the small unit salesmen.

The Inverted Arc.—The triumph of the inverted gas arc lamp, and this really commences the subject proper as assigned, is most convincingly shown in the fact that it has united all lamp makers in advocacy of a high power unit. Advertising cuts that formerly showed rooms perfectly lighted with single burners, and with arc lighted rooms in some shadow, have been redesigned and the surplus ink transferred to the single burner establishment. Indeed all signs point to at least a season of busy arc lamp campaigning on the part of all the former somewhat conflicting interests. The last rock-ribbed fortress of single-mantle lamp advocacy among the gas companies has also bowed to the honor and glory of the inverted gas arc.

In the introductory days of the inverted arc I ventured the statement that the successful lamp could not depend alone on the natural tendency of the inverted mantle to throw its light downward, but that there must also be real increased efficiency per cubic foot of gas burned, that the mechanical features be practical and the design attractive. Lamps combining these features have met with great success.

It is possible to get a much more compact construction in the building of inverted arcs. The elimination of the reflector shade is a decided advantage in looks and in attention required in cleaning. Doing away with the globe holder and all metal work below the mantles is a positive improvement in looks and efficiency.

Candle power figures are largely a matter of advertising ability in giving results without particularizing on method. The system began back in the days when an open circuit, electric arc was called 2,000-candle power. The automobile headlight, with its powerful, concentrated beam of light, shows how a source of small power may be magnified. It would be manifestly unfair to make a photometer reading of this beam and report it as the value of the acetylene flame. On account of this I shall not cumber this paper with a lot of photometer readings, but simply say that the inverted arc of the best class on normal pressure will run from 25 to 30 candles to the cubic foot throughout the 75-zone below horizontal, while the upright mantle arc with shade gives about 20 candles. Possibly some misunderstanding may have arisen on account of reports giving results beneath a shade; really concentration. In many phases of outdoor lighting the only effective light needed is that in the lower horizontal plane, hence figures showing values of 50 candles to the cubic foot are entirely legitimate to offer your customer as the service available.

While on this subject it may be interesting to recount an experience where a purchaser of inverted gas arcs sent hurriedly for a representative of the producing house, demanding explanation of how a single burner, on 3½ feet consumption, was able to show results on an illumination curve in excess of that given by a 3-mantle arc. He was shown that the results plotted in the curve were intensified beams, not widely distributed light. Still not entirely satisfied, it seemed desirable to show him just how an inverted arc would show up under like conditions. He was invited into the testing laboratory, shown a few readings to prove the accuracy of those to which he objected, and then the lamp was fitted with a mirror reflector, and candle power readings, from 3,500 at 0 to 1,700 at 15, were taken in the zone of reflection. A 5 mantle lamp gave results at 0 up to 4,500 candles, the limit of the instruments recording power. Our doubter saw the point.

I do not want to be understood as belittling scientific tests of illuminating agents, but it is against the cleverly phrased and illustrated combination of science and commercialism that you must guard. There is I believe very little, if any, actual misrepresentation of results in photometer work, about all the figures you see are true under the test conditions. Busy gas men, especially in the smaller works, have not the time to study out all the relations between those tests conditions and that of the actual situation he must meet.

Passing by the more complex problems involved in reducing to practical form and workaday conditions, here is a simple instance showing how easily one may lose out if guided solely by theoretical knowledge gained from printed reports. The Humphrey, 4-mantle, upright are lamp, as tested by the Electrical Testing Laboratories, of New York, compared with figures from the same source for the Humphrey 3-mantle inverted arc, are as follows:

Kind of Lamps.	Consumption Per Hour. Cu. Ft.	Candle Power and Angles. 0	15	20	35	60	75	90
Humphrey 4-mantle upright gas arc.	19	236	312	310	365	376	396	376
" 3-mantle inverted " " .	11	238	265	271	288	306	291	266

Readings under more favorable conditions have shown considerably higher candle power for each lamp, but I use these because they were taken under identical conditions. Here we see that in no direction is the 3-mantle inverted are shown to give as strong an illumination as the 4 mantle upright, and on the figures one might hesitate to attempt the substitution of one for the other. Still in the city of Kalamazoo we have changed scores of installations, lamp-for-lamp, with the invariable verdict from the user that his store is better lighted than before.

I am not here to condemn photometer readings, but I do unhesitatingly say that they are not to be accepted as the court of last resort as to what constitutes a practical, merchantable system with which you are to satisfy your trade.

Those stores with the 3-mantle inverted lamps are not as light at the ceiling and upper shelves; this is noticeable to me, but has never been commented on by the merchants. Probably if we rely on the photometer there isn't as much light anywhere, but if the consumer is pleased, and his gas bill reduced in the proportion of 11 to 19, what more can be asked as a selling argument for gas? Why, if our electric friends had a snap of this kind, it wouldn't bother them a moment. They would promptly invent a scientific hypothesis that would be published in every newspaper in the land showing that certain rays unmeasurable on the photometer, but plainly evident to the human eye, were produced in this startling lamp, and probably add that these rays properly directed would cure baldness, indigestion, corns and ingrowing nails.

You have often heard the slight-of hand man warn you to watch closely, that the hand was quicker than the eye; also, that it isn't safe even to believe all you see. It is well to bear something of this kind in mind. The human eye evidently isn't an exact and unvarying instrument of precision. "King's Treatise" gives an absorption of light passing through a globe as 29.48 per cent. for ground glass, 10.57 per cent. from clear glass. The late F. W. Hartley claimed that clear glass increases sensible light from some sources, but places the loss at 18 to 20 per cent. for ground glass. Nevertheless I have heard expert lamp salesmen argue the merits of clear and alabaster glass globes till they were hoarse. The alabaster adherents admitted that the published tables were against them, but claimed that the softer distribution of light was "kinder to the eye," and, therefore, better appreciated. A salesman visited a town not long ago and was told that the largest user of inverted arcs wasn't entirely satisfied. He immediately looked up the place, found clear globes on the lamps, told them they had the wrong globe and substituted alabaster all around. Calling the next day he found a pleased merchant who wondered why the gas company had not given him the globes that gave the best light in the first place.

Please do not take this for unconditional advocacy of alabaster globes, because there cannot be any question about the clear glass giving most light. The point I wish to establish is that the eye and the photometer do not always measure light in the same way. Efficiency tests of mantles show the same way; those with a yellow tinge give higher photometer readings, yet many people demand white light mantles because they give the impression of greater lighting power.

Choice of Inverted Unit.—In this discussion I refer to the 3 mantle lamp, more particularly because it is the one that has been found to take the place of the 4-mantle upright arc, and as we are all perfectly familiar with what the lamp has done, it serves better as a basis of comparison. I do not want to be understood as recommending its use to the exclusion of higher power units. The prime object of the

gas arc, from the gas man's standpoint, is to sell gas. We want to sell just as much of it as we can, and at the same time keep our customer convinced that he is getting full value received. Careful study of conditions is recommended to determine whether the demand is for more light at the same expenditure or for equal light atless cost. This isn't as simple a thing to learn as seems on its face; most consumers will promptly state, if such a question is even hinted at, they want to cut the cost of their lighting. Statements of this sort formerly fooled me, and our company lost gas sales by it. In our zeal to do what the consumer claimed he wanted, we sought to keep the cost down, even at some loss of lighting power. The electric man would come along, wire him up for twice the light, charge three times as much and get away with it. That man actually wanted more light and was willing to pay for it, and the electric man's better discernment got him the business. Therefore, I repeat, be very sure you have the situation sized up. If it is a big store, and you think it should have more light, fearlessly advocate a 5 mantle inverted arc, without regard to anything that may have been said about reducing the cost. Give the results and payment will come easily. Costs never hurt any business as much as poor service. Use the lamp that you, in your better judgment, decide best answers the purpose. Many times the position of the gas outlets limits the number of lamps; use the higher power arcs in such places. Almost invariably it is the case in churches and public halls that 5-mantle lamps meet the demand. I might go on at some length with particular examples, but I believe enough has been stated to make my position clear.

Effect of Inverted on Other Arcs.—The inverted arc was not accepted without fear that it might be the means of driving out in large numbers the upright arcs heretofore in satisfactory operation. Gas men are much more conservative in these things than their electrical competitors, who have made a clean sweep in their lighting equipment not once but several times in their rather brief existence. The tungsten lamp has displaced excellent electric arcs by the thousand. In one case a glass salesman told me a profitable globe business, in one of the largest cities in the country, had dwindled to nothing, not because inclosed arcs were not used, but due to the fact that the electric company had taken out so many of its own lamps in bettering its service that it had globes enough from those to take care of the entire demand in that city.

I have always been a believer that it is to a gas company's best interest to retain ownership of the arc lamps, and thus control maintenance, and also have exact knowledge at all times of the lamps on duty. No one is going to pay for lamp service if lamps are not used, and in consequence a live list is always on file. This is a most valuable, if not always comfortable record. Some managers take great pleasure in stating we have sold 1,000 gas arcs, but the man who knows he has 1,000 gas arcs in service is apt to please his stockholder better even should he have several hundred back in the stockroom retired from dead locations. This bogie of lamps in the stockroom has cost gas companies more revenue than all their gasoline competition, much as the latter has hurt their pride. It has come up in the introduction of the inverted arc more strongly than ever before, and doubtless has made some of my friends wonder if my advice to retain ownership of the upright lamps was well founded. I maintain that it was. It will be an exceptional case where the upright lamp has not paid for itself in profit on gas sales, and your new business men are in better position to hold a dissatisfied consumer when they can offer to substitute without expense the improved inverted arc. Gas sales are the essential thing, and the plan that puts the lamps in use in the quickest time, and keeps on selling gas year-in-and out, permitting the substitution of the most modern devices without the customer feeling that he is being burdened with obsolete material, is the one to follow.

It has not been difficult to get a rental maintenance rate of 50 cents per month for inverted arcs as against 25 cents for upright. Business men have assured me that this is small, as compared with gas saved in 3 mantle lamps, and in the case of 5-mantles the light is found to be greatly increased with same gas consumption. In Pittsburgh, upright arcs have been installed and maintained free on account of severe natural gas competition; but with choice of a lamp at no cost, and an inverted arc at 25 cents per month, the latter have been called for by the hundred. Kalamazoo merchants are paying 50 cents per month for inverted arcs, when uprights are obtainable at half the cost.

There are, however, always a large number of people who change slowly. What was good enough last year will suffice for several to come. Twenty-five cents is preferred to 50 for later improvements, and this acts as a balance wheel steadying the demand for the newest improvement. I do not know of a gas company, which had in service any considerable number of upright lamps, prior to the introduction of inverteds, which has lost to exceed 25 per cent. of the upright lamps formerly in service as a result of inverted competition. Rather has the new lamp created a place for itself where business was unattainable previously with other gas lamps. A large department store in my home city is a conspicuous example. They could see nothing but electric lighting, would not consider arcs as even an auxiliary, but maintained the most antiquated long arm fixtures of the vintage of 1870 for breakdown service with open gas jets. Apparently they delighted in showing gas at its very worst on the occasions it became unavoidable to use it. The inverted arc, however, struck their fancy by its more ornamental, yet simple lines, and a complete installation was made at their own request. They had been abandoned as hopeless gas prospects. Planned simply to be breakdown auxiliaries, I have watched them with the greatest interest, and note they have been put in almost daily service, still I venture the assertion that the proprietors would probably claim today that gas is merely a reserve in their store.

Compare the magnificent illuminating displays of our last two national gas shows with what was formerly available, and the inverted arc must be credited with the wonderful change. Business that couldn't be touched formerly is being reached every day. For special purposes the inverted arcs may be incorporated as parts of special fixtures to carry out an architectural plan of decoration. The magnificent fixtures of the new Peoples Gas building in Chicago, would not have been built were the inverted arc not at hand to be adapted to the special coverings there used.

Disposition of Upright Arcs. As the advantages of the inverted arc are better understood unquestionably they will dispace the upright arc. If that lamp were about at the limit of its useful life it would be retired without ceremony or regret. Unfortunately in some respects they have amply verified the claim that they were built on honor, and would wear, and the gas man faces the problem of disposition of a perfectly good and usable lamp that is simply a bit out of date. I know that many have changed hands at $1 apiece, but take for argument a valuation of $2 on an old lamp in perfect working order. That lamp is no longer to be considered in the $6 to $8 class, which may not be profitably installed, except as it promises a commensurate return in gas sales. A $2 lamp simply represents the outlay for a very modest single burner and pendant, and a lamp so considered becomes legitimately available for scores of locations ordinarily not arc lamp prospects.

In the early days of the gas arc lamp my fitters would bring in requests for lamps in small corner groceries, outlying saloons and other places using but about 1 burner where the monthly gas bill did not average $1 the year around. I say fitters, because in our judgment we were selling them all they would buy, and it was considered no use wasting solicitors time on them. We discouraged the demand, explained that a gas arc meant an average gas bill of $2.50 per lamp per month, but were forced to install a few, and last summer, 8 years later, I saw nearly all of those same lamps in use and every gas bill in my time had jumped beyond my estimated figures without a murmer of discontent. These people wanted more light, but they wanted it convenient to operate, and always ready in first-class shape without bother on their part. Our maintenance did that and they paid the bills for more gas.

This doesn't convey anything new to you in connection with regular arc lamp practice, but it suggests to me that there are dozens of locations in any city that have never been satisfactorily lighted because not considered worth attention, either by the owner or the lighting companies. Take the storage rooms for reserve stock in the average retail store, usually miserably lighted; small offices with cobwebby gas fixtures; little repair shops of carpenters or metal workers; blacksmith shops and the like. There are times right along when light is required. Isn't it reasonable to assume that a flood of sunshiny illumination will be appreciated, and in the greater comfort of it longer hours of demand will come, possibly not the regular gas arc volume, but enough to pay you handsomely on your $2 investment.

Factories where the lighting demand is but a few hours per week, during a brief, dark season, will not justify a large expenditure by you or them in lighting fixtures, but $2 arc lamps are something heretofore unheard of. Try a few; you will be surprised at the result. Don't overlook the prospect for breakdown service in all gas-piped factories producing their own current. They do not have the reserve equipment of the central station, and once in you can prove where gas light in certain departments will put off the operation of the electric system many hours per month.

Combination companies may find an excellent outlet for upright arcs that have served their original purpose, by distributing them about among their strictly electric consumers for emergency service. The most out-of-date gas arc ever produced will be an improvement in appearance on the long arm, old-fashioned gas fixtures so generally retained for breakdown use.

Maintenance.—Inverted arcs were originally more complicated than now, and seemed to require greater mechanical ability in the men in charge. That is no longer the case. Fluctuations in pressure and quality of gas, while always things to be avoided in the ideal gas plant will occur, and were at first rather marked in their effects on the inverted arcs. Better understanding of conditions has practically eliminated all this.

Maintenance costs with upright arcs have been thoroughly proven by years of service to run from 20 to 25 cents per month on the average, and accordingly this is no longer a debatable subject. When considering inverted arcs there has been some apprehension that the up-keep would be higher. In fact when all other arguments have failed, this contention has been brought out as justifying a refusal to adopt the inverted arc with its many admitted advantages. To get some exact data on this very important point I sent letters to about 50 representative gas companies throughout the country, asking how their maintenance cost on inverted arcs is running. A number of companies stated that their figures were involved with other items of expense in such a way that exact data could not be furnished, but that they were entirely satisfied the cost was reasonable.

The lowest figures reported are from a company maintaining 564 3-mantle lamps, in a widely scattered suburban district, the total cost per lamp per month being 13.31 cents, divided as follows: Mantles, 4.89 cents; globes, 2.07 cents; labor, 6.85 cents. A significant thing in connection is that this is a high pressure plant which is enabled with service regulators to keep absolutely uniform pressure at the lamp. Other low costs average from 16 to 20 cents per lamp

per month, expense being about uniformly divided in this way: Mantles, 6 to 8 cents; globes, 2 to 3 cents; labor, 8 to 10 cents. The greatest number show monthly costs of from 20 to 25 cents, with labor holding fairly steady at 10 to 12 cents per month, mantles and globes making up balance in about same ratio as above stated.

The data received, combined with my own observation of experimental and actual working installations, proves conclusively to me that inverted lamps, for equal candle power under intelligent and friendly supervision, cost less than upright lamps to maintain.

Breaking down the last objection, we can briefly summarize the positive merits of the inverted gas arc lamp:

Like its forerunner, the upright arc, it sells more gas for the investment required than any other fixture or appliance.

Light-for-light, it gives a competitive weapon, operating on 12 feet of gas per hour, that will replace a lamp requiring 18 to 20 feet.

Its increased efficiency per cubic foot of gas burned makes it possible to give a vastly greater amount of illumination without extra cost for gas.

It is a thoroughly practical lamp, the maintenance cost of which is only nominal.

It does not follow the tungsten electric lamp, and save money in energy required, only to take it away again in higher upkeep expense.

It is the most compact, attractive, high power gas lamp ever offered the public.

It gives opportunity for ornamentation and adaptation to special architectural effects.

It gets lighting business never before obtainable.

It appeals to the man who has considered gas lamps not quite good enough for his business place.

It has enabled us in our gas shows to make such striking displays that gas lighting has been dignified and advertised in a manner never before possible.

It has demonstrated that gas lighting has advanced in keeping with present day progress.

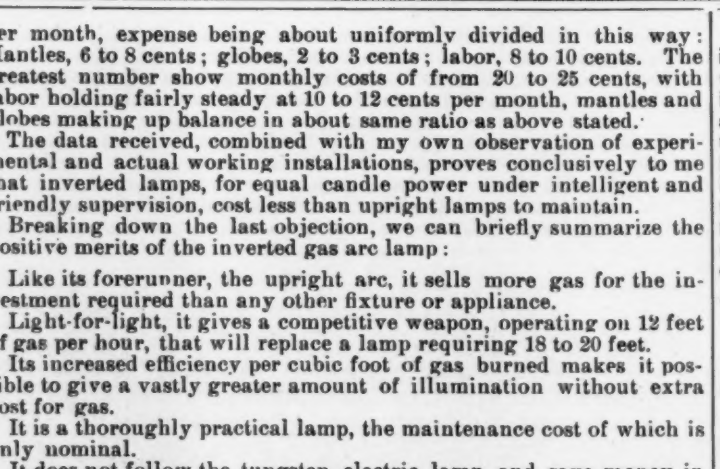
It gives gas companies a lamp that is new, novel and revolutionary, yet a proven success.

It keeps gas lighting in an aggressive position, and we all know that the aggressive fighter gets the decision.

(To be Continued)

Management & Commercial Methods.

AN UP-TO-DATE DELIVERY METHOD.—For many years the ancient house, known as the Nathaniel Tufts Meter Company (and an honorable house it always was), went on the even tenor of its way, holding in at least fair measure the gas meter trade of the New England States. However, it was not until that prince of mechanics (Dr. C. W. Hinman) and that director of salesmen (Mr. H. A. Norton) assumed potent voice in the Company that the old concern begun to loosen up and try on business according to modern ideas. Office quarters were properly placed, a factory was nicely equipped and the road practice was bettered. Now comes a delivery wagon, which, as



shown in the cut, is a handsome specimen of the American Locomotive Company's goods truck. The Tufts Company's specimen is of the 3-ton order—it is equally good for 7,000 pounds—but when fully loaded with meters the weight carried never exceeds 5,500 pounds. During the first 3 months of its employment by the Tufts folks—which 3 months average the busiest ones in its year—the truck has carried over 25,000 new and repaired meters, and has travelled 2,300 miles altogether, these averaging something in excess of 30 miles per day. The longest run so far was to Worcester (Mass.) from the shops and return, a distance of 86 miles. The time taken up was 9 hours, 5 minutes; running time, 8 hours, 15 minutes; average speed per hour, 10.4 miles. The Company not only saves the exense of packing, and the purchasers the freight charges and cost of unpacking, but the matter of deliveries is attended to with greater despatch and certainty, to say nothing about the excellent condition in which the meters come to hand.

PASTE SOLDER IN PASTEL PACKET.—A certain concern in this city is putting on the market a new type or style of soldering material, which is intended for handy use in cases of emergency. It is packed in collapsible tubes, and the method of using it is: Squeeze the tube and from the lips thereof, scrape off the exuding paste and apply the same by smearing it quite like the tinker who uses the old-fashioned "tinker's dam" way of doing a soldering job. The paste having been smeared on, apply the flame of a match, or candle, or torch to the surface. The material then fuses and solders, quite after the fashion of the soldering stick. It is said to be effective and permanent, and if so it has the further decided advantage of economy, convenience or adaptability, and cleanliness.

Items of Interest
FROM VARIOUS LOCALITIES.

HERE is a word from Sterling Fyfe Hayward, who at the time of writing (the 1st inst.) was located in "The Royal Hotel, Edinburgh:"

Dear JOURNAL: I have had you in mind and fully intended to write you before this, but the time has been so taken up with seeing, and one is so tired at night after a full day's journeying, one does not feel much like writing. I am having one of the dreams of my life realized, to visit Scotland with my family, and the realization far exceeds the anticipation. I need not tell you how much I have enjoyed it. Then, too, the right way to see this country is to view it from a motor—the roads are fine. Even Harold, who thinks nothing here quite equals our own country, has been completely converted by them. It is almost like riding on a billiard table. I want to tell you how nicely I have been received by the gas men. Their kindness and courtesy quite overcome me. We have pretty thoroughly taken in England, Wales and Scotland, as far North as Inverness. Yesterday we ran through Melrose and Abbotsford. How we did enjoy the hallowed precincts of Sir Walter Scott's old home. The study and the library, with its 20,000 tomes, just as he left them. * * *. Regards to all.—Sincerely yours, STERLING FYFE HAYWARD. —How's that for Scotch?

A CONTRACT has been awarded by the Temple (Tex.) Gas Light Company, covering the manufacture and erection complete, by the United Gas Improvement Company, of a 4-foot United Gas Improvement Company's water gas set of its well-known double superheater type. The owners of the Temple Company have also authorized the Kerr Murray Manufacturing Company, of Fort Wayne, Ind., to construct a steel storage holder up to retaining 77,000 cubic feet, and a relief holder of 5,000 cubic feet capacity. The Kerr Murray folks will also lay in the condensers, purifiers, scrubbers, etc. All this work is to be completed by November 1st. Mr. H. M. Wallace, President of the Temple Gas Light Company, is quite enthusastic over the immediate future of this fast growing Texas business center.

THE contest for control in the affairs of the Louisville (Ky.) Gas Company, as between those in charge and those who disagreed with the management, resulted in a decisive voting for the former. The vote, which represented 99 per cent. of the Company's total share issue, was: Regular, 16,646 shares; opposition, 9,645. The successful ticket contained these names: F. M. Sackett, D. X. Murphy, Hugh Alexander, Jas. Glazebrook and Henry Almstedt.

HERE is the way that the Chicago *Journal*, of July 7th, puts it: "Declaring he could not be made a party to political intrigues to make improper use of data," given him in confidence by the Peoples Gas Light and Coke Company, Mr. J. W. Hagenah, public utility expert, resigned from the city service to-day. "I cannot become a party to a political intrigue or to a conspiracy in which I would be in the position of what I consider a sacred obligation;" his face flushed and his eyes flashing with indignation. "I am an accountant hired to make a report from figures as they are. I have made such a report. When the city becomes unfair I am forced to part ways with the city service, just as I would have to sever my relations with any other corporation or concern which would exact what I deem highly improper and a gross breach of faith. The data I have gathered was for ratemaking purposes and not for any other purpose. I cannot surrender it and therefore resign." With these words the young Wisconsin Professor left the room.

THE following announcement recently made to the residents of Marion, Ind., by Mr. John L. McCulloch, explains itself: "In my last statement in regard to artificial gas for Marion, I informed you I had just taken over all the holdings of the Marion Gas Company

in the city of Marion; also all the holdings of the Crescent Oil and Gas Company in Hartford City, including an 8-inch pipe line from Hartford City to Upland, and was making other plans to get ready to furnish both Marion and Hartford City with artificial gas at as early a date as possible; promising also in that statement to keep the public promptly informed as these further plans progressed. I am glad to inform you now that these plans are maturing rapidly and favorably. I have just perfected an agreement with Mr. Rufus Dawes and his brothers, of Chicago, who have for some time owned and controlled the gas interests of Muncie, by which agreement the Marion, Muncie and Hartford City gas interests will all be consolidated into one big company, with each of these cities connected with an 8 inch pipe line. For the Marion end, we have just purchased the old Marion Fruit Jar and Bottle Company plant in South Marion, from Ball brothers, and will erect immediately on that site a complete and modern gas plant, with a 500,000 cubic feet gas holder of sufficient size and capacity to fully and completely supply Marion residents with all the artificial gas they can use. This plant and holder have been contracted for so that both must be completed ready for use not later than November 15th, with a penalty clause in the contract for any delay beyond that time. In addition to this there will be a modern gas plant and gas holder completed at Muncie, about the same time, and a gas holder erected at Hartford City at the same time; and as all these cities will be connected with an 8-inch pipe line as stated above, Marion will really have the advantage of 2 gas plants instead of 1, and in case of accident or trouble at one plant, the gas will be pumped back and forth between these cities, so that Marion is absolutely sure of a steady and sufficient supply of gas under any and all conditions. In addition to this, the Dawes Bros., have had many years' experience in furnishing different cities in various parts of the country with artificial gas. Each of those cities had a good word to say from them, and that their promises have alwas been kept, and they have given the finest and best of service. I feel then that I have aided and helped Marion by taking them in as partners on this matter. Their years of experience will be a great help and aid, and also tend to get quicker results, and I know that Marion citizens are anxions to get a good supply of artificial gas at the earliest moment possible."

THE Board of Aldermen of Waterbury, Conn., have approved by vote a resolution informing the Legislature that the Board is not opposed to the bill now before the General Assembly of Connecticut, authorizing the Waterbury Gas Light Company to increase its capital stock to $1,000,000, and to emit a bond issue of $1,000,000.

THE incorporators of the proposed Statesville (N. C.) Gas Company are: W. E. Webb, of Statesville; H. N. Street and J. M. Thissel, of Philadelphia, Pa.

PIPE lines from the Santa Ana plants of the Southern Counties Gas Company, were connected at Anaheim and Fullerton, Cal. The supply will be carried under high pressure from the Santa Ana plant to Anaheim and Fullerton, district regulators being stationed at various points along the route.

ADVICES from San Francisco, Cal., under date of the 1st inst., says, that Judge Morris has entered consent to the compromise stipulation filed by City Attorney Long, whereby the three suits of the San Francisco Gas and Electric Company against this city will be settled on an equal division basis. More than $1,000,000 of impounded funds, the excess charged by the corporation over the rates fixed by the Board of Supervisors, will now be paid back to the consumers. As per stipulation agreed to by the city and the Gas Company, the 85-cent rate will prevail from the 1st of July, 1911, until January 1, 1912. From the latter date until the following July the rate will be 80 cents. The corporation has agreed not to contest these rates. The same stipulation holds in the cases of the Metropolitan Gas and Electric Company for 1910 and 1911.

THE St. Johns (N. B.) Railway Company has ordered the Gas Machinery Company, of Cleveland, O., to refill two half depth benches of 6's, using silica retorts and settings.

ANOTHER contract recently awarded the Gas Machinery Company was that signed by the proprietors of the Bethlehem (Pa.) Consolidated Gas Company, under which a 6 foot 6-inch water gas apparatus is to be installed. Superintendent J. W. Murdock is to be congratulated over his plan of thus early arranging for the putting in shape of the generating plant underway, to meet the increased demand for gas which has really accompanied the intelligent system of main extensions planned early this spring.

MR. D. A. LINDSEY, a prominent railroad man in the South, for many years connected with the Pennsylvania lines, particularly the Star-Union line, has been appointed Vice-President of the Atlas Paint Company, Nashville, Tenn. He assumed his new duties the 1st inst.

THE special gas committee, of the Reading (Mass.) Council, has recommended that an appropriation of $30,000 be made for the construction of a proper system of gas mains.

IT is our pleasant task to report that Mr. George A. Alden, Superintendent of the Gloucester (Mass.) Gas Light Company, will speedily recover from the injuries received by him some days ago through an explosion (slight in itself seemingly) of gas, while he was examining a generator.

UNDER the terms of the agreed-on contract (to run for 5 years), between the authorities of Montclair, N. J., and the New Jersey Public Service Gas Company, for the public lighting of that place, the following will prevail: Not less than 869 street lamps are to be maintained, 650 of which will be of the Welsbach type, single burner, with not less than 5 lamps of the 4-cluster type, the balance to be of the open flame sort. The prices to be paid, per lamp per annum, are: Single burner Welsbach, $26.50; 4-burner clusters, $85; open flame, $18. The contract specifies that the lamps are to be lighted at hours specified by the authorities, but no lamp shall be lighted on a schedule listing over 4,000 hours per year Each lamp is to be cleaned at least once in two weeks, and the Corporation agrees also to light and extinguish. No penalizing clause, as to forfeiture for failure on account of strikes, or other reasons beyond the control of the Company, is in the agreement.

THE proprietors of the Annville and Palmyra (Pa.) gas plant are going along so well that they have purchased additional ground (100 feet by 350 feet) to the rear of the plot already owned by them. It looks they will soon need an additional holder, although the plant has not been in operation much over two years. Good for Superintendent Miller.

AT the annual meeting of the Milwaukee (Wis.) Gas Light Company the following officers were re-elected: Directors, E. McMillin (Chairman), Sheldon J. Glass, Wilmer Sief, Oliver C. Fuller, H. A. Luedke, E. J. Lindsay, A. K. Hamilton, N. P. Hulst and A. P. Lathrop; First Vice-President and General Manager, Sheldon J. Glass; Second Vice-President, Nelson P. Hulst; Secretary and Treasurer, Ewald Haase.

AT the annual meeting of the Lake Charles (La.) City Council, held the 4th inst., bids for the construction of a water gas plant for that place were received. Strange to say, the determination was reached not to open the proposals until the first regular meeting in August.

SOME days ago Mrs. Maria S. Coote and the Rector Gas Lamps Company *per se* leased a portion of the property known as the Coote Estate, Elizabeth, N. J., consisting of 8 lots and a factory building, to which property the Company will remove its present plant at 131 West 131st street, New York. The lease is for 3 years, the Company to have the right to purchase the site at any time within the lease term.

THE North Carolina Gas Company, of Elizabeth City, N. C., has been incorporated by Messrs. James Gamble, A. M. Worstall and E. F. Lamb.

MR. B. L. MAGUIRE, of the Philadelphia Gas and Electric Company, has been appointed New Business Manager by the new proprietors of the Tampa (Fla.) Gas Company. He was before attaching himself to the first-named concern, connected with the General Gas Light Company, Kalamazoo, Mich.

THERE are 7,153 public lamps in St. Paul, Minn., of the following types: Gas lamps, 4,189; electric arcs, 1,337; gasoline, 1,611. In the arc collection are 303 street lamps of an ornamental character, which were installed by property owners, but which are maintained by the city.

CAPTAIN R. H. SMITH, of Warner, Pa., after 24 years faithful and successful work as Field Superintendent of the Pennsylvania Gas Company, has been retired on a pension. Just prior to his retirement 24 of the field men who served under him clubbed together and presented him with a handsome gold encased timepiece.

MR. JAMES P. GALLAGHER, for several years in the employ of the Bethlehem (Pa.) Gas Company, has resigned from its service.

The Market for Gas Securities.

That dullness, even to inanition, rules the share market, is best indicated in the pointer that not a share of Consolidated was sold on the Stock Exchange for the past 2 days. The quotation at opening this Friday, was: 145½ to 146.

Brooklyn Union is also neglected. The American Light and Traction Company has declared the usual quarterly return of 1½ per cent. on the preferred; also the regular of 2½ per cent. on the common, with an extra of like amount on the latter. All are payable the 1st prox. Lacledes are coming into their own, at 108 for the common, and Peoples, of Chicago, is steady at 106. There is not much likelihood that a rate lower than 75 cents will be agreed upon in Chicago.

DIVIDEND NOTICE

AMERICAN LIGHT AND TRACTION CO.,
60 WALL ST., NEW YORK CITY, July 11, 1911.

The Board of Directors this day declared from the net earnings of the Company the regular quarterly dividend of one and one-half per cent. (1½ per cent.) on the preferred stock of this Company, payable August 1, 1911, to stockholders of record of preferred stock at the close of business July 17th, 1911. The Board also declared, from the undivided profits of the Company, a quarterly dividend of two and one-half per cent. (2½ per cent.) on the common stock of the Company, payable August 1, 1911, to stockholders of record of Common Stock at the close of business July 17th, 1911. The Board also declared, from the undivided profits of the Company, a dividend of two and one-half (2½) shares of common stock on every one hundred (100) shares of common stock outstanding, payable Aug. 1, 1911, to stockholders of record of common stock at the close of business July 17th, 1911. The transfer books for both preferred and common stock will close July 17, 1911, at 3 o'clock P.M., and will reopen Aug. 1, 1911, at 10 o'clock A.M.

1884-1 C. N. JELLIFFE, Secretary.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.
115 BROADWAY, NEW YORK CITY.
JULY 17.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$78,177,000	100	145⅝	146
Central Union Gas Co.—1st 5's, due 1972, J. & J.	3,000,000	1,000	103	105
Equitable Gas Light Co.—Con. 5's, due 1932, M. & S.	1,000,000	1,000	115	118
Mutual Gas Co.	3,500,000	100	155	165
New Amsterdam Gas Co.—1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98¼	100½
New York and East River—1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	95	100
Northern Union—1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	50	70
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	103	105
The Brooklyn Union	15,000,000	1,000	142	144
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106¾	107
Yonkers	299,650	509	130	—
Out-of Town Companies.				
Bay State	50,000,000	50	⅝	⅛
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	509,000	1,000	95	100
Boston United Gas Co.—1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47⅜	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	50	60
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,660,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	92	93
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90¼	91
Preferred	3,026,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	13 467,84	100	106½	—
Mortgages, 5's	3,470,000	—	89	100
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	—
Con. Mtg. 5's	974,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	3,500,000	—	102	105
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,350,000	1,000	100	101
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	108	108½
Indianapolis	2,000,000	—	78	83
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	86
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis.	10,000,000	100	107¼	107⅜
Preferred	2,500,000	100	91½	102
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	400,000	1,000	108	108½
Massachusetts Gas Companies, of Boston	25,000,000	100	91	91¼
Preferred	25,000,000	100	95¼	95½
Montreal Gas Co., Canada	2,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	105⅞	106
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104⅜	105¼
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.—1st Mtg. 5's	1,000,000	1,000	100	102
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	104	108
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	3,447,000	1,000	97	98
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	101	103
Washington (D. C.) Gas Co.	1,600,000	200	445	450
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,00	50	261	—

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, October 18, 19, 20, 21, 1911. St. Louis, Mo. Officers: President, Donald McDonald, Louisville, Ky. Secretary, A. B. Beadle, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting, ——— Officers President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keillor, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, Nov., 1911. New York City. Officers: President, M. J. Brayton, Utica, N. Y.; Secretary, C. H. B. Chapin, 29 W. 39th street. New York City.

Guild of Gas Managers of New England.—Annual meeting, March, 1912. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, Walter G. Africa, Manchester, N. H.; Secretary, H. K. Morrison, Brockton, Mass.

Illinois Gas Association.—Annual meeting, time, March, 1912, Chicago, Ills. Officers: President, C. B. Strohn, Elgin, Ills.; Secretary-Treasurer, F. E Newberry, Dixon, Ills.

Illuminating Engineering Society.—Annual meeting, Sept. 25, 26, 27, 1911, Chicago, Ills. Meetings of Sections, monthly. Pres't, A. E. Kennelly, Boston, Mass.; Secretary, Preston S. Millar, 29 W. 39th street, N. Y. City. Sections: New York, Secretary, Albert J. Marshall, 36 West 39th street. New England, Secretary, W. S. Farrow, 1240 Massachusetts avenue, Cambridge, Mass. Philadelphia, Secretary, S. B. Eichengreen, Broad and Arch streets. Chicago, Secretary, F. H. Beruhard, Marquette Building.

Indiana Gas Association.—Annual meeting, Jan. 17 and 18, 1912, Indianapolis. Officers: President, S. E. Mulholland, Fort Wayne; Vice-President, Howard L. Olds, Indianapolis; Secretary-Treasurer, Philmer Eves, Indianapolis.

Iowa District Gas Association.—Annual meeting, time, May, ——, 1912; Clinton, Ia. Officers: President, G. W. Clabaugh, Omaha, Neb.; Secretary and Treasurer, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, time, ——— Wichita, Kas. Officers: President, W. A. Scothorn, Hutchinson, Kas.; Secretary and Treasurer, J. D. Nicholson, Newton, Kas.

Michigan Gas Association.—Annual meeting, time, Sept. 20, 21, 22, 1911; Detroit, Mich. Officers: President, A. P. Ewing, Detroit, Mich.; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April, 1912: St. Louis, Mo. Officers: President, F. E. Murray, Louisiana, Mo.; Secretary and Treasurer, N. J. Cunningham, Springfield, Mo.

National Commercial Gas Association.—Annual meeting, October 23-28, 1911. Denver, Officers: President, C. N. Stannard, Denver; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, May, 1912, Kansas City, Mo.; Officers: President, A. B. Macbeth, Independence, Kas. Secretary, T. C. Jones, Delaware, O.

New England Gas Association.—Annual meeting, third Wednesday in February, 1912, Boston. Officers: President, J. A. Coffin, Gloucester, Mass.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

New Jersey State Gas Association.—President, William H. Pettes, Newark, N. J.; Secretary-Treasurer, Arthur H. Osborn, Belmar, N. J.

Ohio Gas Association —President, John M. Garard, Columbus, O; Secretary-Treasurer T. C. Jones, Delaware, O.

Pacific Coast Gas Association.—Annual meeting, Sept. 20, 21 and 22, 1911, Oakland, Cal. Officers: President, F. A. Lesch, Jr., Oakland, Cal.; Vice President, W. Baurhyte, Los Angeles, Cal.; Secretary-Treasurer, John A. Britton, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, April, 1912, Williamsport, Pa. Officers President, C. W. Butterworth, Millon, Pa; Secretary-Treasurer, William H. Merritt, Lebanon, Pa.

Society of Gas Lighting.—Annual meeting, December, 1911; monthly meeting, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 254 West 89th street, New York city.

Southern Gas Association.—Annual meeting, April, 1912, Jacksonville, Fla. Officers: President, H. B. Hoyt, Jacksonville, Fla.; Secretary-Treasurer, E D. Brewer, Atlanta, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. April 27, 28, 29, 1912; Houston, Tex. Officers: President, J. E. Carroll, Beaumont, Tex.; Secretary, D. G. Fisher, Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May 15 and 16, 1912, Milwaukee, Wis Officers: President, H. M. Buck, Waukesha, Wis.; Secretary-Treasurer, Henry Harmon. Milwaukee, Wis.